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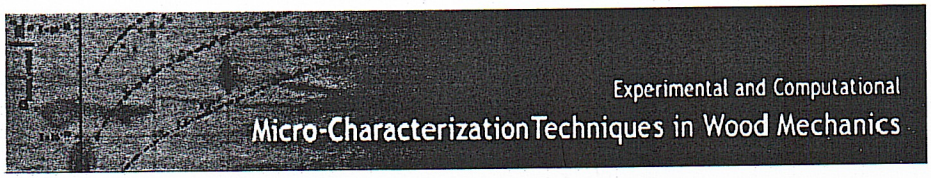

POLARIZED FT-IR STUDY OF CELL WALLS OF A HARDWOOD AND A SOFTWOOD

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The cell wall can be considered as a nano-composite in which cellulose, lignin and hemicelluloses are interconnected in a specific manner. Structural organisation of the cell wall and related polymers is important for mechanical properties of the plants and chemical reactions occurring in the wall space.

With the use of imaging FT-IR microscopy, run in transmission mode and at different polarisation modes (from 0° to 90°), it is possible to follow the chemical variability and the orientation of cell wall polymers. The orientation of different wood polymers (cellulose, glucomannan, xylan and lignin) from *Picea omorika* (Panč) *Purkyne* (spruce, softwood) and *Acer* sp. (maple, hardwood) were analysed with respect to the sample axis. Tree vibration peaks of cellulose, the antisymetric C-O-C bridge stretching vibration at 1160 cm^{-1}, the C-H bending vibration at 1370 cm^{-1} and the C-OH bending vibration of the CH_2-OH group at 1424 cm^{-1} was found to be oriented parallel to the fibre axis. A cellulose vibration, the CH_2 wagging vibration at 1317 cm^{-1} oriented perpendicular to the cellulose chain was also found. Hemicelluloses (xylan- vibrations at 1734 cm^{-1}, 1460 cm^{-1}, 1240 cm^{-1}, and glucomannan- vibration at 810 cm^{-1}) are parallel with the longitudinal axis of the isolated cell wall of maple and omorika. Absorption vibration of glucomannan was found at 870 cm^{-1}only in softwood sample. A lignin vibration, i.e. the C=C aromatic ring vibrations at 1505 cm^{-1} showed a positive signal indication orientation of the lignin structure in parallel with the fibre axis, but G ring plus C=O stretching vibration at 1266 cm^{-1} was found only in softwood sample.